

DIFFUSE SEPTIC PERITONITIS, DUE TO APPENDICITIS.

WITH REFERENCE TO AFTER-TREATMENT WITH POSTURAL DRAINAGE.

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FROM July 1, 1898, to January 1, 1908, there were treated in this hospital, exclusive of the service of Dr. Robert Abbe, 69 well-marked cases of diffuse septic peritonitis, *i.e.*, cases in which the entire greater sac was involved. Care has been taken to exclude from this series all lesions which might possibly have been interpreted as spreading processes, by which is meant an inflammation located in one quadrant or half of the abdominal cavity, not confined by adhesions. An analysis of the cases occurring during these successive years has been undertaken.

1898. Four cases were operated upon (one case not included died on the table before the abdomen was opened); 100 per cent. succumbed to combined shock and sepsis. All but one case, which survived five days, died during the first twenty-four hours. The earliest operative interference was instituted on the third day of appendicitis, the latest on the seventh day of the disease.

Operative Procedure.—(1) Incision. Preference was given to multiple incisions, seven and one-half centimetres, with openings for counter-drainage in both flanks. The manner of dealing with the appendix need not detain us. (2) Flushing. Irrigation of the peritoneal cavity with normal salt solution at a temperature of 110° F. was practiced in all four cases, the septic material being sponged away and dried. (3) Drainage. To dismiss this subject summarily, all the cases observed over a period of ten years were drained. In cases in which multiple openings were made, each incision received a tube of glass or rubber (for the most part rubber)

with an iodoform gauze wick directed down into the pelvis, up toward the diaphragm or among the intestinal coils. In other cases a Mickulitz or a *cigarette* drain was employed, and incision partially sutured in the usual manner.

After-treatment.—The after-care covering the four cases of 1898 was as follows: Immediately following operation but small quantities of water were given by mouth, later restricted fluids. The wound was dressed each day and irrigation through the drainage-tubes practiced with hot normal salt solution. Saline enemas were administered to be retained, every one or two hours for three injections, or continuous saline irrigation every four hours for fifteen minutes was given. Stimulating and nutrient enemas were given. Lavage for persistent vomiting was resorted to and either castor oil or magnesium sulphate left in the stomach.

1899. Eleven cases were operated upon; all but one died, succumbing to causes other than complications, making a mortality of 90.9 per cent. The case which survived was operated upon on the third day of the disease, as were four others. The earliest mechanical intervention was on the third day, the latest on the twenty-first day of the disease. Of the remaining six fatal cases, one received operative treatment on the twenty-first day, one on the eighth, one on the seventh, one on the sixth, one on the fourth, and one on the second day of the disease. Of the ten deaths, seven occurred during the first twenty-four hours, one on the second day following operation, one on the third and one on the fourth.

Operative Procedure.—(1) Incisions were slightly larger, multiple in all cases for counter-drainage. (2) Flushing was practiced in eight cases, in three it was not. The single case which recovered was irrigated.

After-treatment.—In brief it was as in the preceding year. Magnesium sulphate was occasionally added to the saline irrigation of the rectum. Oil enemas and the usual medicated enemas were given (magnesium sulphate, ox-gall, turpentine, glycerine, etc.). In one case, salts were injected into the intestine, as recommended by Dr. McCosh. One case received

magnesium sulphate (two drachms) every hour by mouth for four doses. Calomel in serial or single doses was given on the first or second day following operation. Croton oil was used in a few isolated cases, one minim on the tongue, or in some cases given in the enema. In addition to usual stimulants as heretofore employed, Credé's inunction found favor in some cases.

1900. Eight cases were operated upon with but two recoveries (mortality of 75 per cent.). Of these recoveries one was treated by operation on the first day and was discharged cured in thirty-three days, the other was operated upon on the third day and was discharged cured in thirty-six days. Of the six fatal cases, three survived the twenty-four hour period, death occurring on the third to the fifth day from combined shock and sepsis. Three died within the first twenty-four hours without complications.

Operative Procedure.—(1) In the majority of cases a seven and one-half centimetre intermuscular incision was made directly over the appendix; in a few a median incision; in all cases multiple incisions for counter-drainage. Puncture of the transverse colon was made in one case with subsequent suture. (2) Six cases were irrigated and two were not. The two cases which survived were flushed out in the manner described.

After-treatment.—(1) The wound received attention as heretofore, and was irrigated through the drains with half strength borosal solution. No new or other method of treatment not already described was employed. (2) Postural drainage. In April of this year Dr. George Ryerson Fowler¹ published an account of the advantages of the Elevated Head and Trunk Position. Of eight cases occurring in this hospital in 1900, this method of treatment was adopted in one case with one death. In this case the trunk was elevated on the operating table during irrigation of the peritoneal cavity. The patient was in extremis when brought to the hospital and profoundly septic, and died three days after operation. Of seven cases not treated by postural drainage two recovered.

¹ Med. Rec., vol. lviii, No. 15, p. 617, 1900.

1901. Five cases were operated upon with two deaths (mortality of 40 per cent.). Of the three cases which recovered, one received operative treatment on the third day, one on the seventh and one on the thirteenth day of the disease. The average stay in the hospital was sixty-four days. The longest period of convalescence was seventy-four days, being protracted by an enterostomy. The two deaths, one occurring on the third day and one on the fourth day, were attributed to sepsis and shock independent of intercurrent affections.

Operative Procedure.—(1) Incision as before over the appendix, sufficiently large to deal satisfactorily with the organ. (2) Flushing. Lavage of the peritoneum with normal salt solution was done in four cases. Two patients recovered.

After-treatment.—(1) Consisted in such measures as hitherto practiced with the following exceptions: Six cases received irrigation through the drainage tubes, some with borosal (one-half strength), others with hydrogen peroxide followed by normal salt. In one case an incision was made into the intestine two days after operation, the contents evacuated and the incision closed by suture. In two instances an enterostomy was performed; one died, the other was cured. (2) Postural drainage. The bedside notes indicate that this treatment was carried out in but one case. The patient recovered.

1902. Two cases were operated upon with two deaths. In these cases death was due to shock and sepsis; in one, operation was undertaken on the second day, this case survived two days, and in the other case on the third day. This case succumbed on the eighth day after operation.

Operative Procedure.—(1) Incision. Single incisions $7\frac{1}{2}$ to 15 centimetres long. (2) Flushing was practiced in one case.

After-treatment.—Rectal irrigations, enemas, etc., as before. In one case an inguinal colostomy was performed on the tenth day after operation and the intestine irrigated. This was followed by continuous irrigation of the rectum up to the time

of death. Postural drainage. The nurses' notes fail to state that advantage was taken of the postural position.

1903. Four cases were treated by operation and four deaths occurred, exclusive of complications.

Operative Procedure.—The cases were in extremis at time of operation. Multiple incisions were made for counter-drainage, effected by rubber tubes as heretofore. Two cases were irrigated; two were not.

After-treatment.—(1) This differed in no way from the ordinary routine of the preceding years. In one case the cæcum was incised, the contents evacuated, followed by instillation of magnesium sulphate and oleum tiglii. (2) Postural drainage was instituted in four cases.

1904. Ten cases were operated upon with three recoveries (70 per cent. mortality.). The average period of convalescence was twenty-eight and one-half days. Of seven fatalities all cases survived twenty-four hours, except one which died on the table.

Operative Procedure.—Incisions were multiple and single from 7 to 15 centimetres. Irrigation was performed in eight cases, in two it was not. Two cases irrigated recovered, as did one case which was not.

After-treatment.—(1) In general terms, as previously indicated. Two of the three cases of favorable termination received irrigation through the drainage-tubes, also magnesium sulphate by mouth. In one fatal case the management was, in addition to that indicated, injection of magnesium sulphate into the bowel after the manner of McCosh. (2) Postural drainage was instituted in six cases with three recoveries; in four it was not. One case of the latter died on the table.

1905. Seven cases were operated upon with four deaths, a mortality of 57.1 per cent. An average of thirty-eight and one-half days' convalescence is noted. Of the fatalities, all due to shock and sepsis, two occurred within twenty-four hours after operation. One lived three days and one six days after operation.

Operative Procedure.—Three favorable cases. (1) In-

termuscular incision with Mickulitz drain. (2) Seven centimetre intermuscular incision with gauze drain. (3) Incision at outer border of rectus muscle, with rubber tube drain. The fatal cases received multiple incisions or a 15 centimetre single median incision, with rubber tube drainage, except one which had *cigarette* drainage. Flushing was practiced in four cases with two recoveries; in three it was not, with one recovery.

After-treatment.—(1) The three cases terminating in recovery were irrigated with borosal (one-half strength). This was practiced in one of the four fatal cases. Eserin salicylate was given in one case with recovery and in two cases with two deaths. The other details were as given above. (2) *Postural* drainage was used in the three cases which recovered and in two of the cases which died. One of the latter was in *extremis* before operation and succumbed just after the first twenty-four-hour period. Two died that did not receive postural drainage.

1906. Seven cases were operated upon with five deaths (71.4 per cent. mortality). The two cases which were cured left the hospital on the thirtieth and sixtieth day respectively. Of the fatal cases, one died two hours after operation, performed on the fifth day. Another case also operated upon on the fifth day survived twenty-four hours; two lived two days, one operated upon on the first day and the other on the third day of the disease.

Operative Procedure.—(1) Incision. Seven-centimetre intermuscular incision in the right iliac region was made in two favorable cases; the same was performed in the remaining five, except two which received multiple incisions. Flushing. Three cases were irrigated, with two deaths, and four were not, with three deaths.

After-treatment.—The main features were as given in the previous years. *Postural* drainage. Four of the seven cases were placed in the semi-sitting posture, with two deaths; one was in *extremis* before operation and survived but two

hours. Three deaths occurred in three cases not treated in this way.

1907. Eleven cases were operated upon with four deaths (36.3 per cent. mortality). The operation was performed on the second day, thirty-sixth hour, third, fourth, fifth, sixth, and seventh day respectively in the cases terminating in recovery. The average stay in the hospital was forty-one and one-half days, the longest necessitated by the development of a secondary pelvic abscess. Of the fatal cases, two were operated upon on the second day; one of these developed four days later intestinal obstruction, angulation freed by operation, and one day later, fifth day after original operation, an enterostomy was performed. The patient died on the ninth day of shock and sepsis. The other case died on the second day after operation. Of the two remaining fatal cases, death occurred in one, on the third day, and in the other twenty-four hours after operation.

Operative Procedure.—(1) Incision. Seven and one-half centimetre intermuscular incision in all cases. A secondary operation was necessary to free a kink giving rise to intestinal obstruction on the fourth day after operation in one case; on the fifth day an enterostomy was performed. (2) Flushing was carried out in ten cases, with three deaths; in one it was not, with one death. Postural drainage was instituted in all cases.

After careful consideration of these cases and the results of others, the following conclusions are reached:

1. We must look for a lowering of the high mortality rate in early operation, rather than in any further development in mechanical intervention. Dr. Blake's² statistics in spreading peritonitis show a mortality of 14.3 per cent. (21 cases).

2. Early institution of postural drainage. This is of greater aid in preventing septic material from reaching the diaphragmatic peritoneum than in preventing further absorp-

² Treatment of Diffuse Septic Peritonitis, N. Y. and Phila. Med. Jour., Nov. 19, 1904.

tion after this area is once involved. Ambulance cases of peritonitis of this nature are frequently brought to the hospital in the sitting posture. The trunk should be elevated during lavage of the peritoneum. The manner of instituting postural drainage matters but little, provided that the pelvis is sufficiently low for gravitation to take place, and the patient is comfortable. At the German Hospital in Brooklyn a wooden frame is employed to raise the head of the bed, and a folded pillow beneath the knees, held in place by a bandage, prevents the patient from slipping. This secures an elevation of seven, thirteen or twenty inches as desired. At St. Luke's, Manhattan, a bed-rest is often employed, such as is used for cardiac cases, and the head of the bed elevated. At St. Luke's Hospital in Richmond, Va., a wooden frame is used to support the patient who lies upon a flat mattress, the head of the bed being elevated. Swings, blocks, hammocks, shoulder rests, etc., have been used for this purpose. It is difficult to maintain some patients, who are under mental strain, in the semi-sitting posture; in such cases muscular tension may be relaxed by having the patient lie flat; they are frequently unconscious of the elevation when well supported by a pillow or protected wooden rest.

3. Peritoneal lavage dilutes septic material, and when practiced should be continued until the cavity is partially closed. Plastic lymph not removed by irrigation or by simple lifting should not be disturbed.

4. Wound drainage. All cases of this nature should be drained. The ideal method, in women, is by a posterior colpotomy incision, by means of a large rubber tube. Cases not drained frequently develop pus pockets and superficial wound infections.

5. Ochsner's treatment should be instituted after operation and Murphy's proctoclysis practiced.

6. Open the abdomen by a small incision over McBurney's point, deal quickly with the primary focus, prevent evisceration and use greatest gentleness in handling parts.

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ANALYTICAL TABLE.

| Year. | Cases. | Deaths. | Mortality. | Irrigated. | Deaths. | Not Irrigated. | Deaths. | Postural Drainage. | Deaths. | No Postural Drainage. | Deaths. | Enterostomy. | Deaths. | Mortality. |
|----------------|--------|---------|------------|------------|---------|----------------|---------|--------------------|---------|-----------------------|---------|--------------|---------|------------|
| 1898 | 4 | 4 | 100 % | 4 | 4 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 93.3% |
| 1899 | 11 | 10 | 90.9% | 8 | 7 | 3 | 3 | 0 | 0 | 11 | 10 | 0 | 0 | |
| 1900 | 8 | 6 | 75 % | 6 | 4 | 2 | 2 | 1 | 1 | 7 | 5 | 0 | 0 | 62.9% |
| 1901 | 5 | 2 | 40 % | 4 | 2 | 1 | 0 | 1 | 0 | 4 | 2 | 2 | 1 | |
| 1902 | 2 | 2 | 100 % | 1 | 1 | 1 | 1 | 0 | 0 | 2 | 2 | 1 | 1 | |
| 1903 | 4 | 4 | 100 % | 2 | 2 | 2 | 2 | 4 | 4 | 0 | 0 | 0 | 0 | |
| 1904 | 10 | 7 | 70 % | 8 | 6 | 2 | 1 | 6 | 3 | 4 | 4 | 0 | 0 | |
| 1905 | 7 | 4 | 57.1% | 4 | 2 | 3 | 2 | 5 | 2 | 2 | 2 | 0 | 0 | |
| 1906 | 7 | 5 | 71.4% | 3 | 2 | 4 | 3 | 4 | 2 | 3 | 3 | 0 | 0 | |
| 1907 | 11 | 4 | 36.3% | 10 | 3 | 1 | 1 | 11 | 4 | 0 | 0 | 1 | 1 | |
| Total..... | 69 | 48 | | 50 | 33 | 19 | 15 | 32 | 16 | 22 | 18 | 4 | 3 | |
| Mortality..... | 69.5% | | | 66% | | 78.9% | | * 50% | | * 81.8% | | 75% | | |

* Statistics since 1900, i. e., adoption of postural drainage.